

REMARKS

Telephone Interview

Applicants' attorney thanks Examiner Caschera for the courtesy of a telephone interview on September 30, 2004, in which the claims and references of record were discussed, along with the discussion presented below.

Claim Status

Currently, claims 1-18 are pending in this application, with claims 1, 6, and 14 as independent claims. In this Preliminary Amendment, Applicants amend independent claims 1, 6 and 14, support for which can be found in the specification at least, for example, at paragraphs [0030] through [0032]. No new matter has been added.

Claim Objections

In the Final Office Action, claims 4, 5, 9, 10, 17 and 18 were objected to and said to be allowable if rewritten in independent form. Applicants thank the Examiner for indicating that these claims would be allowable.

Claim Rejections

In the Office Action, claims 1-3, 6-8, and 11-16 were rejected under 35 U.S.C. § 102 (e) as being anticipated by Mutoh, U.S. Patent No. 6,631,210 ("Mutoh").

Independent Claims 1, 6 and 14

Independent claims 1, 6, and 14 are rejected under 35 U.S.C. § 102 (e) as being anticipated by Mutoh. Applicants respectfully traverse this rejection. Mutoh is directed to a method for “discrimination between character areas and mesh areas as well as the discrimination between black areas and white areas.” Mutoh, Abstract lines 21-24.

Mutoh describes finding a density difference sum as “an addition of the sum of absolute values of density level differences between pixels adjacent in the main scanning direction.” Mutoh, column 30 lines 31-35. In contrast to Mutoh, Applicants’ independent claims 1 and 6 as amended each recites, in part “determining a smoothness index based on one or more non-linear statistical characteristics derived from the plurality of spatial gradients.” In addition, Applicants’ independent claim 14 recites, in part, “a separator module for calculating . . . a smoothness index based on one or more non-linear statistical characteristics in response to the plurality of spatial gradients.”

Applicants respectfully suggest that a “smoothness index” based on a “non-linear statistic” is not equivalent to the “density difference average” of Mutoh. The “density difference average” of Mutoh is just that – an average of a series of values, whereas Applicants’ “smoothness index” is calculated using a non-linear statistic. In fact given the same set of image data would produce substantially different results. For example, line image data representing a transition from a graphical content and textual content may be stored as the vector {2, 3, 3, 4, 2, 2, 8, 9}, with the transition point being between the 6th and 7th pixel. Using the methods described in Mutoh, the density difference value would be calculated by averaging the differences from each pixel to the next, or mathematically:

$$\frac{|3-2|+|3-3|+|4-3|+|2-4|+|2-2|+|8-2|+|9-8|}{8} = \frac{11}{8} = 1.375,$$

which, because of the number of pixel transitions with relatively low differences, results in a statistic close to 1, and therefore falsely implies a smoothness and does not reflect the sharp transition from pixel 6 to pixel 7. The claimed methods and system overcome this shortfall by introducing a non-linear statistic. As one possible calculation indicates below, using the same set of sample data results in a much higher different smoothness index:

$$\frac{(|3-2|+|3-3|+|4-3|+|2-4|+|2-2|+|8-2|+|9-8|)^2}{|3-2|^2+|3-3|^2+|4-3|^2+|2-4|^2+|2-2|^2+|8-2|^2+|9-8|^2} = \frac{121}{43} = 2.81.$$

By using one or more non-linear statistics, the resulting smoothness index gives greater consideration to large gradients, or stark increases or decreases in pixel values from one pixel to the next. As a result, when compared to threshold values, boundaries between text and image areas that would otherwise go unnoticed can be identified and the proper imaging methods can then be employed to properly render the image.

As such, Applicants respectfully submit that Mutoh fails to teach each and every element of Applicants' independent claims 1 and 6, and those claims that depend directly or indirectly therefrom.

CONCLUSION

In view of the foregoing, Applicants respectfully request reconsideration, withdrawal of all grounds of rejection, and allowance of claims 1-18 in due course. The Examiner is invited to contact Applicants' undersigned representative by telephone at the number listed below to discuss any outstanding issues.

Respectfully submitted,

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